```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline

from scipy import stats
from keras.datasets import imdb
from keras.preprocessing.sequence import pad_sequences
from keras.models import Sequential
from keras.layers import Embedding #changed from keras.layers.embeddings to keras.layers
from keras.layers import SimpleRNN,Dense,Activation

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))


(X_train,Y_train),(X_test,Y_test) = imdb.load_data(path="imdb.npz",num_words=None,skip_top=0,maxlen=None,
                                                   start_char=1,seed=13,oov_char=2,index_from=3)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/imdb.npz
17464789/17464789 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
```

```
print("Type: ", type(X_train))
print("Type: ", type(Y_train))
```

```
Type:  <class 'numpy.ndarray'>
Type:  <class 'numpy.ndarray'>
```

```
print("X train shape: ",X_train.shape)
print("Y train shape: ",Y_train.shape)
```

```
X train shape:  (25000,)
Y train shape:  (25000,)
```

```
print(X_train[0])
```

```
[1, 608, 13, 6467, 14, 22, 13, 80, 1109, 14, 20, 584, 18, 231, 72, 141, 6, 783, 254, 189, 7060, 13, 100, 115, 106, 14, 20, 584, 207,
```

```
review_len_train = []
review_len_test = []
for i,j in zip(X_train,X_test):
    review_len_train.append(len(i))
    review_len_test.append(len(j))
```

```
print("min: ", min(review_len_train), "max: ", max(review_len_train))
```

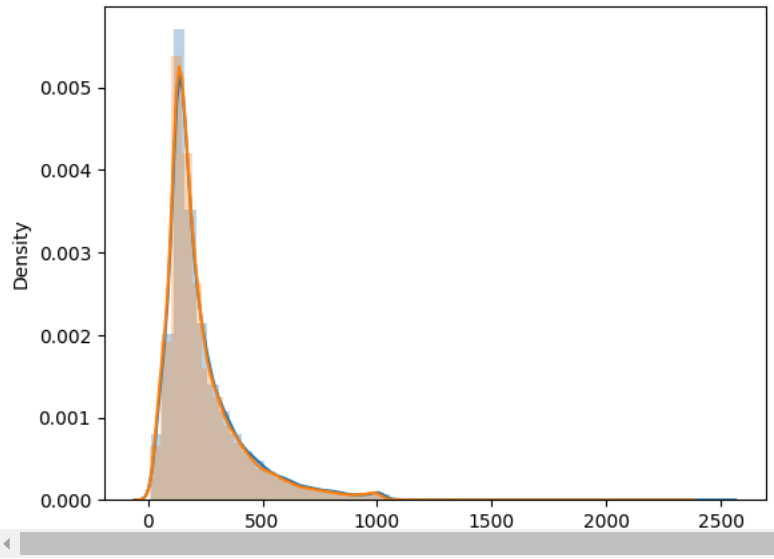
```
min:  11 max:  2494
```

```
print("min: ", min(review_len_test), "max: ", max(review_len_test))
```

```
min:  7 max:  2315
```

```
sns.distplot(review_len_train,hist_kws={"alpha":0.3})
sns.distplot(review_len_test,hist_kws={"alpha":0.3})
```

```
<ipython-input-9-7037aabe6f55>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(review_len_train,hist_kws={"alpha":0.3})
<ipython-input-9-7037aabe6f55>:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(review_len_test,hist_kws={"alpha":0.3})
<Axes: ylabel='Density'>
```




```
print("Train mean: ",np.mean(review_len_train))
print("Train median: ",np.median(review_len_train))
print("Train mode: ",stats.mode(review_len_train))
```

```
Train mean:  238.71364
Train median:  178.0
Train mode:  ModeResult(mode=132, count=196)
```

```
# number or words
word_index = imdb.get_word_index()
print(type(word_index))
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/imdb_word_index.json
1641221/1641221 ━━━━━━━━━━━━━━━━━━━━ 0s 0us/step
<class 'dict'>
```

```
def whatItSay(index=24):
    reverse_index = dict([(value,key) for (key,value) in word_index.items()])
    decode_review = " ".join([reverse_index.get(i-3, "!") for i in X_train[index]])
    print(decode_review)
    print(Y_train[index])
    return decode_review

decoded_review = whatItSay()
```

```
! this movie was extremely funny i would like to own this for my vintage collection of 1970s movie must see again list i know this c
1
```

```
decoded_review = whatItSay(5)
```

```
! quite possibly how francis veber one of the best comedy directors in the world at least when sticking to his native france manage
0
```

```
num_words = 15000
(X_train,Y_train),(X_test,Y_test) = imdb.load_data(num_words=num_words)


maxlen=130
X_train = pad_sequences(X_train, maxlen=maxlen)
X_test = pad_sequences(X_test, maxlen=maxlen)


print(X_train[5])
```

```
[   0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    0    0    0
    0    0    0    1  778  128   74   12  630  163   15    4 1766 7982
 1051    2   32   85  156   45   40  148  139  121  664  665   10   10
 1361  173    4  749    2   16 3804    8    4  226   65   12   43  127
   24    2   10   10]
```

```
rnn = Sequential()

rnn.add(Embedding(num_words,32,input_length =len(X_train[0]))) # num_words=15000
rnn.add(SimpleRNN(16,input_shape = (num_words,maxlen), return_sequences=False,activation="relu"))
rnn.add(Dense(1)) #flatten
rnn.add(Activation("sigmoid")) #using sigmoid for binary classification

print(rnn.summary())
rnn.compile(loss="binary_crossentropy",optimizer="rmsprop",metrics=["accuracy"])
```

```
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/embedding.py:90: UserWarning: Argument `input_length` is deprecated. J
  warnings.warn(
/usr/local/lib/python3.10/dist-packages/keras/src/layers/rnn/rnn.py:204: UserWarning: Do not pass an `input_shape`/`input_dim` argum
  super().__init__(**kwargs)
Model: "sequential"
```

Layer (type)	Output Shape	Param #
embedding (Embedding)	?	0 (unbuilt)
simple_rnn (SimpleRNN)	?	0 (unbuilt)
dense (Dense)	?	0 (unbuilt)
activation (Activation)	?	0 (unbuilt)

```
Total params: 0 (0.00 B)
Trainable params: 0 (0.00 B)
Non-trainable params: 0 (0.00 B)
None
```

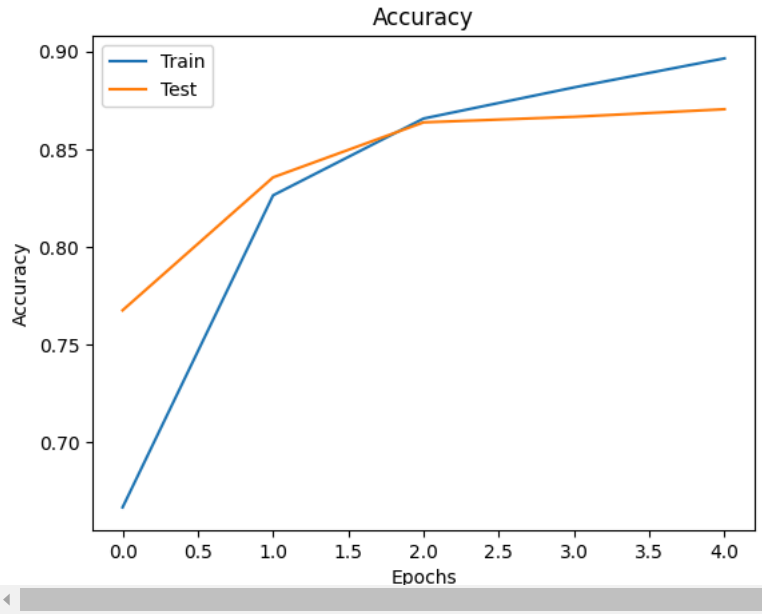
```
history = rnn.fit(X_train,Y_train,validation_data = (X_test,Y_test),epochs = 5,batch_size=128,verbose = 1)
```

```
Epoch 1/5
196/196 ━━━━━━━━━━━━━━━━━━━━ 13s 51ms/step - accuracy: 0.5938 - loss: 0.6658 - val_accuracy: 0.7676 - val_loss: 0.4872
Epoch 2/5
196/196 ━━━━━━━━━━━━━━━━━━━━ 11s 54ms/step - accuracy: 0.8173 - loss: 0.4257 - val_accuracy: 0.8356 - val_loss: 0.3813
Epoch 3/5
196/196 ━━━━━━━━━━━━━━━━━━━━ 19s 48ms/step - accuracy: 0.8623 - loss: 0.3308 - val_accuracy: 0.8637 - val_loss: 0.3256
Epoch 4/5
196/196 ━━━━━━━━━━━━━━━━━━━━ 9s 48ms/step - accuracy: 0.8834 - loss: 0.2804 - val_accuracy: 0.8665 - val_loss: 0.3170
Epoch 5/5
196/196 ━━━━━━━━━━━━━━━━━━━━ 10s 51ms/step - accuracy: 0.9002 - loss: 0.2591 - val_accuracy: 0.8704 - val_loss: 0.3118
```

```
score = rnn.evaluate(X_test,Y_test)
```

```
782/782 ━━━━━━━━━━━━━━━━━━━━ 8s 10ms/step - accuracy: 0.8705 - loss: 0.3121
```

```
plt.figure()
plt.plot(history.history["accuracy"],label="Train");
plt.plot(history.history["val_accuracy"],label="Test");
plt.title("Accuracy")
plt.ylabel("Accuracy")
plt.xlabel("Epochs")
plt.legend()
plt.show();
```




```
plt.figure()
plt.plot(history.history["loss"],label="Train");
plt.plot(history.history["val_loss"],label="Test");
plt.title("Loss")
plt.ylabel("Loss")
plt.xlabel("Epochs")
plt.legend()
plt.show();
```